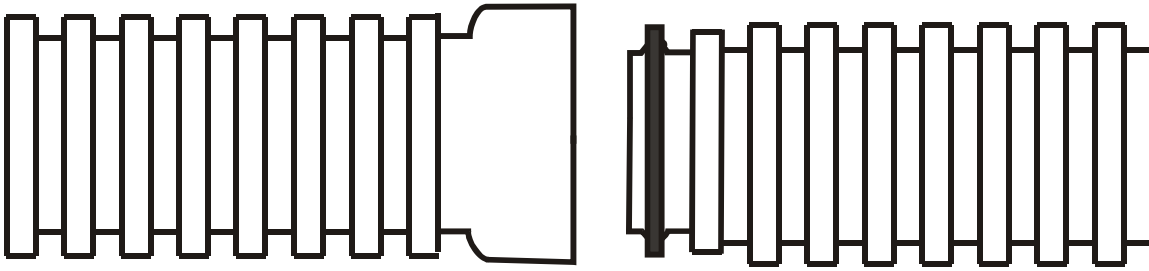


# **Quality Systems Manual (QSM)**

## **Eastern States Consortium HDPEP Program**

**(CT, DE, DC, ME, MD, MA, NC, NH, NJ, NY, PA, RI, VT, &VA)**



**March 1, 2004**  
**Last revised July 25, 2006**



*8516 Twp. Rd. 137*  
*Paulding, OH 45879*  
*Phone: (419) 399-3160*  
*Fax: (419) 399-4641*

## **INDEX**

- SECTION 1: INCOMING MATERIALS
- SECTION 2: MIXING OF MATERIALS
- SECTION 3: EXTRUSION
- SECTION 4: LENGTH
- SECTION 5: PERFORATIONS
- SECTION 6: FINISHED PRODUCT STORAGE
- SECTION 7: LOADING FOR SHIPMENT AND UNLOADING AT THE  
CUSTOMER'S SITE
- SECTION 8: PURCHASED FITTINGS AND OTHER SUPPLIED ITEMS
- SECTION 9: OTHER SPECIALTY PRODUCED ITEMS TO MEET CUSTOMER  
REQUIREMENTS
- SECTION 10: DISPOSITION OF SCRAP MATERIAL
- SECTION 11: QUALITY TESTING
- SECTION 12: QUALITY AUDITS
- SECTION 13: ANNUAL SUBMISSION OF PIPE SAMPLES

## COMPANY MISSION STATEMENT

Baughman Tile Company, Inc. continually strives to become the highest quality provider while maintaining excellent customer service and a low cost position in the corrugated pipe market.

Our company President and CEO, Gene A. Baughman, endorses this quality mission statement and it is made available to all employees both upon hire, annual training, and on the employee board. (Please see Attachment 8)

## SECTION 1: INCOMING MATERIAL

**Note: A lot is defined as a railcar compartment or hopper truckload of resin. If material is in Gaylord boxes, the lot will consist of the number of boxes on the load or 40 boxes, whichever is less.**

1a. Incoming material shall be type III High Density Polyethylene compound in the form of powder, granules, or pellets. Incoming material for use in AASHTO M294 applications must conform to cell class 435400C per ASTM D3350 or a higher cell class (with the exception that density always must be between .948-.955) and the carbon black content must be between 2% and 5%. Resins accepted for use in AASHTO M294 state pipe must be accompanied by a certification from the manufacturer stating the resin meets all the requirements of M294, including the testing and passing of the NCLS test. In addition, resins accepted for state M294 use must either be included on the PPI listing of approved resins or be independently tested for all M294 properties (including NCLS) by a third party testing agency. Incoming material for use in AASHTO M252 applications must conform to cell class 424420C per ASTM D3350 or a higher cell class (with the exception that density always must be between .945-.955) and the carbon black content must not exceed 5%. In addition, all resins accepted for use in state AASHTO M252 applications must be accompanied by a COA indicating the virgin resin meets the melt index and density requirements of M252.

1b. Incoming material shall be transported in a covered van or a bulk tank truck.

1c. Upon arrival of a shipment, the truck is and shall be weighed before unloading and reweighed after unloading and the scale ticket turned in with the bill of lading. If arriving shipment is in Gaylord boxes, the number of boxes is to be written on the scale ticket.

1d. After the shipment is weighed, a sample is and shall be taken from the shipment. If the shipment is in a tanker truck, the sample is to be taken from at least two (2) places in the truck. If the shipment is in Gaylord boxes, the sample is to be taken from at least three (3) different Gaylord boxes.

1e. While taking the samples, the incoming shipment is to be inspected for foreign matter, wet material, and damage to the shipping containers. If any of the above are found it is to be brought to the quality assurance manager, the plant manager, or the shipping manager and a decision will be made as to the disposition of the material.

1f. The sample taken from the shipment is to be taken to the test lab to be tested for melt flow and density. Each sample is to be tested twice. Testing is to be done with either a “Kayness” or a “Slocumb” tester with the sample being dropped into density vials containing both water and alcohol. The vials are to be checked with a hydrometer before dropping a sample into them. Once a month a sample of resin is to be run through both melt flow testers and the results compared to ensure that both machines are working properly. If the results are not the same, both machines are to be checked out and repaired if necessary. If the material is not within a melt flow range of .15 to .4 for AASHTO M294 and between .4 and 1.0 for AASHTO M252 and the density is not within a range of .948 to .955 for AASHTO M294 and .945 to .955 for AASTHO M252, the quality assurance manager or the president of the company is to be notified and a decision will be made as to the disposition of the material.

1g. If the material is in a bulk truck, it is to be blown into the silo that is specified by the quality manager, plant manager, or shipping manager. The supplier’s name, melt flow, date, and the density of the material is to be written on a paper, attached to a clipboard, located in each plant. If the material is in Gaylord boxes, the suppliers name, melt flow, and density of the material is to be written on each box with a black marker as it is unloaded from the truck. While unloading the material, the containers and the material should be visibly inspected for damage. If damage is found, the quality manager, plant manager, or shipping manager is to be notified and a decision will be made as to the disposition of the material.

1h. When concentrate is received it is to be stored in the same manner as the other material. The quality manager is to verify the carbon percentage and carrier percentage in the load and decide if the amount of concentrate in the mix is to be changed.

1i. The material is to be stored where it cannot become contaminated, wet or otherwise damaged to where it cannot be used.

1j. Non-conforming material will be rejected and the truck not unloaded.

1k. No raw materials will be used unless the lot has been tested and passes the requirements of the appropriate AASHTO and ASTM cell classification or the resin has been sent with a resin producer certification.

1l. Resin test reports and resin producer certifications will be retained for a minimum of 5 years.

1m. Fittings and couplings are manufactured both by Baughman Tile Company, Inc. at 8516 Twp. Rd. 137 Paulding, OH and by an offsite blow molder. All resins accepted for use must meet the same stringent requirements as those mentioned above for the pipe, namely section 6 of M252 and M294. All fittings are date coded to trace the fittings back to material lots.

## SECTION 2: MIXING OF MATERIALS

2a. AASHTO M252 & AASHTO M294 material that has a producer certification will never be mixed with any other producer's resin. However, if any material is mixed to be used for M252 or M294 state runs will be assigned a new company material lot # and will be sent out for 3<sup>rd</sup> party testing to TRI/Environmental, Inc. 9063 Bee Caves Road Austin, Texas 78733, to assure properties are met. These tests will be completed and favorable results verified prior to using the resin in production.

In addition, the mixed resin producer lots will be NCLS tested (for M294) at the above location at a minimum of once/quarter if applicable. The material lot # is recorded & referenced on all quality reports.

2b. All boxed material is to be visually inspected for foreign material as they are brought into the mixing room. If foreign material is discovered in the box it is to be set aside and the quality assurance manager, plant manager, or shipping manager will make a decision on the disposition of the material.

2c. The material is to be mixed in eighteen hundred (1800) pound batches. As the material is being loaded into the mixer the color concentrate is to be added. The color concentrate is to be added at the rate of one hundred (100) pounds in black mixes.

2d. When a new shipment of resin or color concentrate is being mixed, a sample of the first mixed batch is to be given to the quality assurance manager, plant manager, or shipping manager for testing to assure proper mix for melt flow and density.

2e. If the mixer associate comes across a box of material that is unmarked, the box is to be set aside and the quality assurance manager, plant manager, or shipping manager will have a sample tested for melt flow and density. The box will then be marked with the melt flow and density and can then be used in a mix.

2f. Any material on the floor is to be considered as contaminated, swept up and either recycled or put in the trash.

2g. A sample of the material being used for each run will be maintained in the office. The sample shall be marked with the pipe size and the run date.

## SECTION 3: EXTRUSION

**NOTE: The plant manager or shipping manager will set the run size and this will be considered a lot and identified by the date stamp.**

3a. The mixed material is to be augured from the mixer into holding bins where it will go through magnets to remove possible steel contaminants from the mix. The magnets are to be removed at least once every eight (8) hours from below the holding bin and cleaned.

3b. As the material flows from the holding bins, the shift supervisor is to maintain proper temperatures on the extruder and die to assure an even continuous flow through the die into the corrugator.

3c. The shift supervisor is to visibly check the plastic out of the corrugator to make sure the pipe is homogenous throughout and essentially uniform in color, opacity, and density. The supervisor and end line technician are to make sure the finished product is free of cracks, holes (unless deliberately placed), blisters, voids, foreign inclusions, mold flash, delamination (liner separation) or any other defects. Supervisors and end line technicians shall also visually inspect the inner and exterior walls for bonding and blowouts.

3d. The shift supervisor is to check the weight of the finished product a minimum of twice/shift, wall thickness (per AASHTO M252 & M294 9.7.4) two times per shift, length (per AASHTO M252 & M294 9.7.2) one time per shift, and inside diameter (per AASHTO M252 & M294 9.7.1) one time per shift. All of these tests shall also be performed at the start of each batch with new material in it. The weight is to be checked in grams/kilograms on a scale. If the weight is off, the supervisor is to change the extruder speed or the corrugator speed to achieve the proper weight. After five (5) minutes the weight is to be rechecked. The wall thickness is to be checked in eight (8) places equally spaced around the circumference of the pipe. Two samples for a total of (16) individual readings are taken and the average wall thickness is recorded. The thickness is to be checked using a micrometer accurate to within .001". If the wall thickness varies significantly, the die is to be adjusted and the pipe rechecked for proper wall thickness. The length is to be checked using a rule accurate to 1/16". Length must be within 99% of the intended length. Record length. The inside diameter of M252 products is to be no more than 4.5% over or -1.5% under. On M252 pipe, the ID is to be checked in 2 random positions, 90 degrees from one another. Two samples for a total of four (4) individual readings are taken and the average ID is to be recorded. These measurements are to be performed with a caliper accurate to a minimum of .001". The inside diameter on M294 products is to be no more than +3% over or -1.5% under. On M294 pipe, the ID is to be checked in eight (8) positions equally spaced around the circumference of the pipe. Two samples for a total of sixteen (16) individual readings are taken and the average ID is to be recorded. These measurements are to be performed with a rule accurate to a minimum of 1/16". If the diameter is out-of-spec, the machine is to be adjusted accordingly. Note: The inside diameter is considered the nominal pipe size.

3e. Pipe is to be marked with the nominal size, date of manufacture, company marking and the proper ASTM and AASHTO number for the size being produced every ten (10) feet. All dual wall pipe is to be marked state hwy, date, shift, and end line technicians initials on the inside with a white or silver permanent marker. These markings provide the required information to trace the pipe back to the resin used and all quality reports.

3f. Once per shift a sample is to be kept from each machine for the quality assurance department. A sample also must be kept from the start of a new batch of material. These samples will be tested for compliance per the corresponding specification.

## **SECTION 4: LENGTH CUTTING**

4a. When cutting lengths, they are to be cut to the required length up to + six (6) inches over but not less than 99% of the overall length under. The shift supervisor is to perform testing to verify that the correct length is still being cut at least once day.

4b. When cutting the pipe, the associate is to make sure the end is cut square and not ragged. In addition, the associate will also make sure the ends are checked for liner separation and any miscuts.

4c. All pipe being cut to length is to be checked for straightness. The allowable tolerance is .5% of the length. If the straightness is out-of-spec, the shift supervisor is to adjust the machine to achieve a good product.

## **SECTION 5: PERFORATIONS AND HOLES**

**NOTE: Various types of products are produced to customer requirements with holes.**

5a. Drilled Poly Smooth-wall Dual Wall pipe: There are to be .197 to .394 inch diameter holes drilled in every valley of the pipe. These holes are to be clean with no ragged edges. This pipe is drilled to the customer's specification when ordered.

5b. Perforated Poly-Drain® Single Wall pipe: When specified, single wall pipe shall be perforated according to the corresponding class found in the respective specifications. Perforations can also be produced as agreed upon by the purchaser and the manufacturer. These perforations are to be clean and uniform with no ragged edges.

5b. The holes are to be checked once per customer order or once per work shift, whichever is more frequent.

## **SECTION 6: FINISHED PRODUCT STORAGE**

**NOTE: All tubing and pipe are tested before a batch is designated and continuously tested throughout the batch run. As each size of pipe is being run for state approval, we will assign a designated storage location for that size. Each batch will be designated by the dates on the pipe itself. All pipe produced for state use will meet AASHTO Specification M252 or M294.**

6a. All finished product is to be placed in its designated area when taken from the machine.

6b. Cut lengths are to be placed in stacks. The stacks are to be straight, neat, and orderly.

6c. Care is to be taken when hauling the pipe to the storage area that it is not damaged in any way.

6d. Pipe is not to be placed in the aisle ways where it can possibly be damaged by tow motors, trucks, and/or trailers as they move through the aisles.

## **SECTION 7: LOADING FOR SHIPMENT AND UNLOADING AT THE CUSTOMER'S SITE**

7a. Associates loading pipe are to visibly inspect the pipe before loading for any damage. If damaged pipe is found, it is to be marked with a pink stripe and it is to be placed in the scrap pile.

7b. Associates loading the pipe are to make sure they are loading the correct pipe on the right truck or trailer.

7c. Associates loading the trucks and trailers are to take care not to damage the pipe while they are loading.

7d. All loads are to be tied down before leaving the premises. This is to be checked by the truck drivers.

7e. When the associate loading the shipment has completed loading, they are to verify the proper size and number of items are on the truck or trailer per the loading sheet.

7f. Truck drivers are to take care when unloading the trucks and trailers that they do not damage the product.

7g. Truck drivers are to verify that what they unload is on the bill-of-lading and that there are no shortages.

7h. Truck drivers are to have the customer sign the bill-of-lading, give the customer their copy, and turn in the signed copy to the office.

## **SECTION 8: PURCHASED FITTINGS AND OTHER SUPPLIED ITEMS**

8a. When purchased fittings and other supplied items are unloaded from the truck, they are to be inspected for damage and checked to make sure they have been properly manufactured. At least two (2) items of each type on the shipment are to be checked for fit in the pipe. If they fit and they pass all quality inspections, the shipment will be accepted. If they do not fit or they fail any of the quality inspections, four (4) more items are to be tested. If any of these also fail the quality tests, the quality manager, plant manager, or shipping manager are to be notified so a disposition on the shipment can be made.



## **SECTION 9: OTHER SPECIALTY PRODUCED ITEMS TO MEET CUSTOMER REQUIREMENTS**

9a. **Filter Wrapped Pipe:** Filter wrapped pipe is to have a cloth tube placed on the pipe with each end and tube joints taped with two (2) wraps of two (2) inch plastic electricians tape. Coils with filter wrap are to be tied at the ends and tape added at joints in the field.

9b. **Double Bells with Gaskets:** When the customer requires gaskets in double bell couplers, a rubber gasket is to be glued in each side of the double bell. When gluing the gaskets in place, first clean the surface with acetone, then coat both the surface of the rubber gasket and the bell with contact cement. Then place the gasket in place making sure the gasket is smooth and the ends are tight together. Now repeat the process on the other side of the bell.

9c. **Pipe with double bells installed:** when pipe is required to have double bells installed, place the bell (both with or without gaskets) on the pipe with two (2) snaps at forty five (45) degrees over the first rib and push the bottom two (2) snaps over the rib.

9d. **Bell & Spigot gaskets:** When making pipe having the bell and spigot type joining system, a elastomeric gasket is to be pre-installed in the gasket groove of the spigot end in the way that allows for proper gasket compression. The gasket is then to be wrapped with plastic wrap to protect and preserve the integrity of the gasket. The company name and corresponding size must be printed on the gasket.

## **SECTION 10: DISPOSITION OF NON-CONFORMING MATERIAL**

10a. When thru testing, if part of a run is discovered to be bad, all pipe produced from the last passing test to the present (or next passing test) shall be held and tested to quarantine the suspected non-conforming product and to determine when the problem began and when it was resolved. The test report shall identify the cause of the original failure and the corrective action required. All pipe in between this time shall be considered non-conforming and must be marked with a pink stripe & put in the scrap pile to be ground up. The pipe can be identified by the date and/or shift written on the inside of the pipe. The passing pipe can be released into the normal production stock pile.

10b. All material going to the scrap pile is to be reground, dried and placed in Gaylord boxes.

10c. The Gaylord boxes of material are to be marked "regrind" with a black magic marker.

10d. A sample is to be taken from each box of regrind and tested for melt flow and density.

10e. Each box is to be marked with the melt flow and the density and can now be blended into the mixes at the rate set by the quality Assurance manager, plant manager, or the shipping manager. Note: Material ground from the scrap pile cannot be used in the State Highway pipe. Material taken straight from the production line (when running state pipe) and ground up can be used in the AASHTO state highway pipe as long as nothing else is being ground up at the same time.

## **SECTION 11: QUALITY TESTING**

**NOTE: When taking samples for testing both the lengths before and after the sample is to be marked with an “S” after the date. The sample is to be marked with the date using a white marker.**

11a. **Testing Equipment Environment:** All areas where testing equipment is located are to be maintained at 73.4 degrees + or – 3.6 degrees. The areas are to be dust free and the equipment kept clean and in proper working order. Ideal humidity level shall be 50%; however, based on previous humidity experimentation on file, test may be completed at any level as long as data is documented on test results.

11b. Listed below are the testing/other responsibilities of the shift supervisor.

- a. Take samples from incoming plastic shipments (section 1d)
- b. Notify quality assurance manager, plant manager, or shipping manager if Gaylord boxes with foreign matter or Gaylord boxes are found unmarked (sections 2b and 2e)
- c. Keep samples (raw material mix) of each new batch and give to the quality assurance manager, plant manager, or shipping manager (section 2d)
- d. Clean magnets (section 3a)
- e. Assure proper melting temperatures on extruders (section 3b)
- f. Make sure the pipe is homogenous throughout and uniform in color, opacity, and density as well as free of cracks, holes, blisters, voids, foreign inclusions, mold flash, or any other defects (section 3c)
- g. Check weight, wall thickness, inside diameter **and length** as per section 3d. If a problem is found, a sample is to be given to the quality manager immediately for testing. All pipe that is questionable must be held and marked with a pink dot on the end of the pipe.
- h. Keep one sample per shift from each machine (section 3f)
- i. Check cuts on the pipe/ section (section 4b)
- j. Inform the quality assurance manager, plant manager, or shipping manager of reground scrap boxes to be checked (section 10d)
- k. Verify that both the production run and material lot # are recorded properly on the PQC report. If there is an error, correct it and inform the quality manager immediately.
- l. Record quality check results on the PQC report forms & turn forms in to Plant Manager or Quality Manager. These reports will be maintained for a minimum of 5 years.

11c. Listed Below are the testing responsibilities of the quality manager, or in his/her absence, the plant manager or shipping manager:

- a. Oversee testing of all incoming material for melt index & density
- b. Oversee testing of all reground material for melt index & density
- c. Oversee testing of all material samples from all new mixed batches for melt index & density
- d. Run Pipe Stiffness tests on a sample from each machine once per run or at least two times each week (whichever is more frequent) per AASHTO M252/M294 9.1 & ASTM D2412
- e. Run Brittleness tests on the samples from each machine once per run or at least two (2) times each week (whichever is more frequent) per AASHTO M252 9.5, AASHTO M294 9.3, & ASTM D2444
- f. Set and formulate the mixes to assure proper melt flow, density, and cell classifications are met & assign a material lot # for formulated mixes.
- g. Spot check that all lengths have the nominal size, date, company name, and the proper specification on them per AASHTO M252/M294 -11
- h. Take random samples from each line at least once per day
- i. Spot check the supervisors on their inspection responsibilities
- j. Verify that the testing facilities are at the proper temperature
- k. Spot-check the storage areas and the loading of trucks and trailers for damaged pipe, misloaded loads, shortages, etc.
- l. Schedule all equipment calibrations with a company that specializes in equipment calibration and oversee the inspection & calibration of all test equipment and if out-of-caliber, have repaired. These records will be maintained for a minimum of 5 years.
  - a. Inspect and compare all testing "tools" (calipers, tape measures, mandrels, scales, etc.) twice per year
  - b. Calibrate flat plate testers once per year
  - c. Inspect and calibrate ESCR oven once per year
  - d. Inspect and check controls on impact tester once per year
  - e. Inspect and check weights on the elongation tester once per year
- m. Run environmental stress cracking once per year per AASHTO M252/M294 9.4 & ASTM D1693. Three samples are taken and the test is considered to be a passing test only if all three samples pass.
- n. Send out sample to TRI/Environmental, Inc. 9063 Bee Caves Road Austin, Texas 78733, to be tested for carbon black content per ASTM D3350 and ASTM on state pipe once per run or once per day (whichever is more frequently)
- o. Check perforation location and dimensions when pipe is being drilled or perforated per AASHTO M252 7.4 & 9.7.3 and M294 7.3 & 9.7.3. This is done once per customer order or once per shift (whichever is more frequent).
- p. Check water inlet area when pipe is being drilled or perforated per AASHTO M252 7.4 & 9.7.4 and M294 7.3 & 9.7.3 once per order or once per shift (whichever is more frequent).
- q. Check the length, inside diameter and liner thickness (if applicable) per AASHTO M252/M294-9.7 and ASTM D2122 at least once per day.
- r. Check Joint Integrity and fittings on the pipe per AASHTO M252-9.8/M294-9.6 once per lot or once per week (whichever is more frequent). For

AASHTO M252 pipe, three (3) samples will be taken and tested for test 9.8.1, one (1) sample will be taken and tested for compliance under 9.8.2, & all four (4) of the above mentioned samples will be checked prior to above mentioned testing in accordance with 9.8.3. For AASHTO M294, one (1) sample will be taken and tested in accordance with 9.6 For integral bell and spigot, testing needs done only once per quarter only.

- s. Check pipe flattening per AASHTO M252/M294 9.2 & ASTM D2412 once per run or two (2) times per week (whichever is more frequent) using the samples from the pipe stiffness test until the inside diameter is reduced by 20 percent. Remove and inspect for cracking, splitting or delamination.
- t. Perform elongation test once per year or once per run (whichever is more frequent) per AASTHO M252 9.3
- u. Perform low temperature flexibility test once/year per AASHTO M252 9.6
- v. Quality reports shall include results of the above listed tests, non-conforming action taken (if applicable), lot identification, and corrective action if required. These reports will be maintained for 5 years.
- w. If a non-conforming product or test result is found a statement clearly defining the deficiencies will be listed on the report and the steps listed under “Section 10, Disposition of non-conforming material” will be followed
- x. Results from these quality control tests will be kept and when appropriate, maintained in a process control chart. These process control charts will be used to plot statistics and monitor production trends. The following shall be monitored on statistical charts:
  - a. Unit weight
  - b. Wall thickness
  - c. Inside diameter
  - d. Pipe length
  - e. Pipe stiffness
  - f. Elongation
- y. Each chart will monitor each production line separately and when appropriate, will monitor total manufacturer quality trends.
- z. Maintain & update copies of current versions of all AASHTO & ASTM standards for all tests performed. Copies of the respective tests will be keep in the testing facility.
- aa. Maintain & update copies of the current QSM for the testing facility
- bb. Maintain records of all ESC reviews and actions taken to resolve any noted deficiencies

Note: Pipe found to be bad during testing and all pipe produced since the last good test will be reground (Please refer to Section 10 for more detail).

Note: All pipe is produced and tested to the latest AASHTO M294 Specification.

## **SECTION 12: QUALITY AUDITS**

- a. Once per year, the quality manager, along with the plant manager will audit the plant for the following:
  - a. Inspect the plant inspection methods (including end line technicians) and all testing equipment
  - b. Review all equipment calibrations
  - c. Observe sampling and testing procedures

- d. Review product certification procedures
  - e. Review testing and inspection report documentation
  - f. Review nonconforming product documentation and actions taken
- b. A report will be developed and audit findings discussed with plant management. Corrective actions will be documented and will be addressed as necessary.

### **SECTION 13: ANNUAL SUBMISSION OF PIPE SAMPLES**

- a. Each year, two pipe sizes will be submitted for testing to an independent laboratory. An ESC rep will select and label the samples to be tested.
- c. Every sample sent out, will have a split corresponding sample that will be tested in house and test reports will be provided to ESC.
- d. Baughman Tile will bear the cost of providing the samples, shipping the samples and the actual independent testing according to the ESC program. Any additional testing requirements will be borne by the department or customer requiring additional testing.

All pipe and tubing covered by this quality plan is produced by Baughman Tile Company, Inc. located at 8516 Township Road 137 Paulding, Ohio

Baughman Tile Company, Inc. manufactures 4, 6, 8, 10, 12, 15, 18, 24, 30, 36, 42, and 48 inch Poly Smooth-Line® dual wall pipe and 3, 4, 5, 6, 8, 10, 12, 15, 18, and 24 inch Poly-Drain® both perforated and non-perforated.

The Quality Representative for this plant is Lorie A. Baughman.

The Plant Manager for this plant is Al Brown.

Supervisors and end line technicians are trained in the current applicable standards and test methods once/year. Reports and audits including testing verifying ability to complete required testing will be documented and maintained on file for a minimum of 5 years.

Baughman Tile Company, Inc. hereby gives authorization to all DOT inspectors (working for any or all members of the Eastern State Consortium for the purpose of the HDPEP program) to enter and inspect the manufacturing facility. We kindly request that inspectors stop by the main office prior to any inspection so that a representative may accompany the inspector and the proper personal safety equipment can be issued.

Any specifying agency may request samples and have them tested at a third party testing lab.

Test reports will be furnished to the customer upon written request only.

### **ATTACHMENTS:**

ATTACHMENT 1: Quality Manager Resume

ATTACHMENT 2: Organizational Chart

ATTACHMENT 3: Sample Resin Report Form

ATTACHMENT 4: Sample PQC Supervisor Report Form

ATTACHMENT 5: Sample Daily Test Report

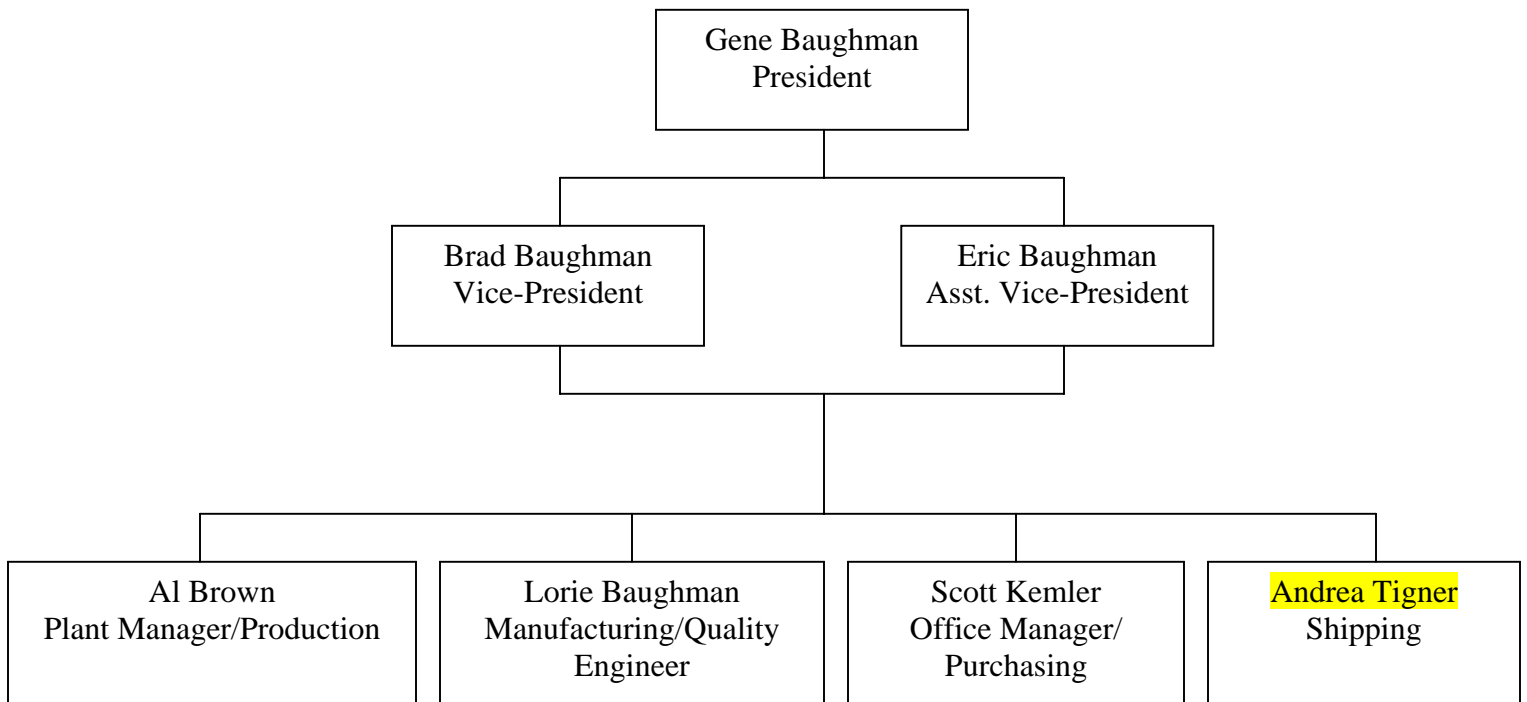
ATTACHMENT 6: Sample Weekly/Run Test Report

ATTACHMENT 7: '04 Quality Audit Report Form

ATTACHMENT 8: Signed Copy of Company Quality Mission Statement

ATTACHMENT 2

### Baughman Tile Organizational Chart





## Resin Test Report

☐ Incoming Material Test

☐ Start of Run Test

☐ Rework Test

☐ Other

Date:

Material Manufacturer & Product Name if applicable:

Manufacturer Lot #:

Production Run # (if Start of Run Test):

Location (Bin # or Slot # if applicable):

---

Summary Test Results:

Melt Index:

Density:

Test Completed By:

Date:

# Daily PQC Checks

ATTACHMENT 4

Production Run #:

Material Lot #:

3" 4" 5" 6" 8" 10"

PRODUCT SIZE (circle one): 12" 15" 18" 24" 30" 36" PRODUCT TYPE (circle one): Dual Wall Single Wall

DATE: Shift (circle one) 1 2 3 Type (ie. 20'links perf):

1. Quality Control Checks Completed By (Please Initial):	2. State and Date written on pipe (with white marker)?	3. Is the wall thickness even and consistent throughout the pipe?	4. Inner Wall thickness (Dual Wall Only)	5. Any Visible Defects? (if yes, please note below)	6. Do perforations meet specifications? (if applicable)	7. Weight of sample? (ex. 1.2 kg)	8. Actual Length of Current Piece of Tubing? (20' and 30' links only)	9. Is the imprint marking correct & visible on the tubing?	10. Actual Inside Diameter?	11. Are ends cut cleanly and squarely?	12. Magnet in holding bin cleaned or screen changed?
7a, 3p, 11p	Y or N	Y or N	Use ESC PQC Checks	Y or N	Y or N		Use ESC PQC Checks	Y or N	Use ESC PQC Checks	Y or N	M S
8a, 4p, 12a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
9a, 5p, 1a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
10a, 6p, 2a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
11a, 7p, 3a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
12p, 8p, 4a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
1p, 9p, 5a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S
2p, 10p, 6a	Y or N	Y or N		Y or N	Y or N			Y or N		Y or N	M S

13.

Please initial next to box

Quality Samples Given to Lab?

y or n

\*If quality issue or discrepancy is found, please notify supervisor immediately and comment below

Quality Comments:





## Required ESC Production Run PQC checks

<b>Production Run #:</b> <b>Material Lot #:</b> <b>Date:</b> <b>Shift:</b>	<b>Pipe Size:</b> 3" 4" 5" 6" 8" 10" 12" 15" 18" 24" 30" 36" <b>Pipe Type:</b> Single Wall Dual Wall	M252 M294 Type C/CP Type S/SP
---	---	--

Test Applicable to AASHTO M252 & AASHTO M294 State Pipe Type S/SP					
Inner Wall Thickness		Inner Wall Thickness		Inner Wall Thickness	
	Sample 1		Sample 2		Sample 3
M1		M1		M1	
M2		M2		M2	
M3		M3		M3	
M4		M4		M4	
M5		M5		M5	
M6		M6		M6	
M7		M7		M7	
M8		M8		M8	
Sum:		Sum:		Sum:	
AVERAGE (Sum/8):		AVERAGE (Sum/8):		AVERAGE (Sum/8):	

Test Applicable to AASHTO M252 State Pipe Type C/CP & S/SP			
Inside Diameter		Inside Diameter	
	Sample 1		Sample 2
M1		M1	
M2		M2	
Sum (of all 4 measurements):			
AVERAGE (Sum/4):			

Test Applicable to AASHTO M294 State Pipe Type C/CP & S/SP			
Inside Diameter		Inside Diameter	
	Sample 1		Sample 2
M1		M1	
M2		M2	
M3		M3	
M4		M4	
M5		M5	
M6		M6	
M7		M7	
M8		M8	
Sum (of all 16 measurements):			
AVERAGE (Sum/16):			

Test Applicable to AASHTO M294 State Pipe Type C/CP & S/SP	
Length	
	S1
M1	

Home of Poly-Drain<sup>®</sup>, Poly Smooth-Line<sup>®</sup>, Poly 3-Wall<sup>®</sup>, and PolyCap<sup>®</sup>

**DAILY (OR RUN) QUALITY LAB TEST REPORT**

Assigned Production Run #:

Material Used (Density, Melt Flow, Manufacturer, Lot #):

Beginning Date of Run:

Ending Date of Run:

Date Test Completed:

**I. Workmanship-**

**Specifications:** Free of foreign inclusions and visible defects. The inner liner shall be fused to the outer corrugated wall at the internal corrugation crests.

**Test Results:**

	PASS	FAIL
ALL SAMPLES		

**Conclusion:**

**II. Pipe Dimensions**

**A. Wall Thickness**

**Specifications:** The minimum inner wall thickness requirement is xxx". This is not applicable to Type C pipe.

**Test Results:**

**Conclusion:**

S1	S2	S3	S4	S5	S6	S7	S8	Mean	STD	Pass	Fail
								#DIV/0!	#DIV/0!		

## B. Inside Diameter

**Specifications:**

**Test Results:**

		Inside Diameter (in)	% oversize/undersize	Pass	Fail
S1	M1				
	M2				
	M3				
	M4				
	M5				
	M6				
	M7				
	M8				
S2	M1				
	M2				
	M3				
	M4				
	M5				
	M6				
	M7				
	M8				
	Mean	#DIV/0!	#DIV/0!		
	STD	#DIV/0!	#DIV/0!		

**Conclusion:**

## C. Length

**Specifications:** The length must be at least 99.25% of stated length.

**Test Results:**

	Length	Pass	Fail
S1			
S2			
S3			
S4			
S5			
S6			
S7			
S8			
S9			
S10			
S11			
S12			

S13			
S14			
S15			
S16			

**Conclusions:**

### **III. Pipe Stiffness (Test only required twice/week)**

**Specifications:** The minimum pipe stiffness requirement at 5% deflection is xxxx .

**Test Results:**

	Orientation	Pipe Stiffness	Pass	Fail
S1	0			
S2	45			
S3	90			

**Conclusions:**

### **IV. Pipe Flattening (Test only required twice/week)**

**Specifications:** There shall be no evidence of buckling, cracking, splitting, or delamination when the vertical inside diameter is reduced by 20%.

**Test Results:**

	Pass	Fail
S1		
S2		
S3		

**Conclusions:**

### **V. Brittleness (Test only required twice/week)**

**Specifications:** The pipe specimens shall not crack or split. Five non-failures out of six will be considered acceptable

**Test Results:**

	Pass	Fail
S1		
S2		
S3		
S4		
S5		
S6		

**Conclusions:**

## **VI. Marking**

**Specifications:** Pipe shall be marked at intervals at least every 10 feet with PolyDrain-Paulding, OH, nominal size, AASHTO M294, and appropriate date code marking.

**Test Results:**

	Pass	Fail
S1		
S2		
S3		

**Conclusions:**

## **VII. PERFORATIONS and WATER INLET AREA**

Test required at least once/shift or once/customer order (whichever is more frequent)

Specifications: AASHTO M252- 7.4 & 9.7.3  
AASHTO M294- 7.3 & 9.7.3

Test Results:

<i>Perforation Dimensions</i>			<i>Water Inlet Area</i>		
	Pass	Fail		Pass	Fail
S1			S1		
S2			S2		
S3			S3		

Conclusions:

## **VIII. Carbon Black (Outsourced Test):**

Results to be added when reports received from TRI.

Actual Test Report from TRI kept on file in Run folder.

TRI Test ID #:

Date Test Performed:

S1	S2	S3	Mean	STD	Pass	Fail

TESTS PERFORMED BY: \_\_\_\_\_

DATE: \_\_\_\_\_



8516 Twp. Rd. 137  
Paulding, OH 45879  
Phone: (419) 399-3160  
Fax: (419) 399-4641  
Website: [www.baughmantile.com](http://www.baughmantile.com)

Home of Poly-Drain<sup>®</sup>, Poly Smooth-Line<sup>®</sup>, Poly 3-Wall<sup>®</sup>, and PolyCap<sup>®</sup>

**QUALITY LAB TEST RESULTS (ONCE PER RUN/WEEK)**

Assigned Production Run #:  
Material Used (Density, Melt Flow, Manufacturer, Lot #):  
Beginning Date of Run:  
Ending Date of Run:  
Date Test Completed:

**I. Materials:**

**Specifications:** ASTM 3350 AASHTO M294 (AASHTO M252)  
Minimum cell class 435400C (424420C)  
Density: 0.945- 0.955 g/cm<sup>3</sup> (.940-.955)  
Melt Index: 0.15 to 0.40 g/10 min (1.0-.40)  
Carbon Black Content: 2% minimum/ 5% maximum (shall not exceed 5%)  
SP-NCTL: 15%/24 hours (n/a AASHTO M252)  
NOTE: If one or more of the properties above have a higher cell classification (with the exception of density), the compound is still acceptable provided the requirements are met.

Manufacturer Certified Resin? Y or N  
PPI Certified Resin? Y or N

**Test Results:**

Density:

S1	S2	S3	Mean	STD	Pass	Fail

Melt Index:

S1	S2	S3	Mean	STD	Pass	Fail
			#DIV/0!	#DIV/0!		

**Conclusions:**

## **II. Environmental Stress Cracking**

**Specifications:** There shall be no splitting, cracking, or breaking of the pipe.

**Test Results:**

	Pass	Fail
S1		
S2		
S3		

**Conclusions:**

## **III. Fittings Requirement**

**Specifications:** Pipe connections shall not separate to create a gap exceeding 0.197 inch when measured between the bell and spigot portions of pipe. Fittings shall not crack or delaminate.

**Test Results:**

	Alignment		Joint Integrity	
	Pass	Fail	Pass	Fail
S1				
Two additional samples required for M252 pipe				
S2				
S3				
Strength Test for M252 pipe			Pass	Fail
S4				

**Conclusions:**

## **IV. Elongation Requirement (AASHTO M252 Type C/CP Only)**

**Specifications:** Average pipe elongation shall be less than 10%.

	% Elongation	Pass	Fail
S1			
S2			
S3			
Average			

**Conclusions:**



**V. Low Temperature Flexibility (AASHTO M252 Type C/CP only)**

**Specifications:** There shall be no visible cracking of the pipe after the test is completed.

	Pass	Fail
S1		
S2		
S3		

**Conclusions:**

TESTS COMPLETED BY: \_\_\_\_\_

DATE: \_\_\_\_\_



## '05 Quality Audit Summary

### Background:

On 12/20/2005, a quality audit was completed at Baughman Tile Company. The audit addressed the following areas of the manufacturing facility:

- Testing Equipment & Calibration
- Review of Inspection Methods
- Observation of Sampling
- Observation of Actual Testing
- Review of Resin certification and individual DOT certifications
- Review of testing documentation
- Review of non-conforming product documentation

This audit is required to be performed by the Quality Manager and the Plant Manager or Company Management. Lorie Baughman and Al Brown performed this audit.

### Summary Overview:

In general, the operation was found to be in compliance with the governing quality plan. Some of the details of the quality plan & in-plant implementation that need to be added or that require attention are as follows:

- Large Brittleness tester found to be difficult to operate quickly
- Calibration for Lotes was not on file
- Rented reefer unit calibration records not on file.

### Corrective Action Required:

1. Put in request for loop to be added on the cable of the brittleness tester to allow for ease of testing. Completed 12/05
2. Copy of calibration on Lotes needs to be added to lab folder. (original on wall behind Mr. Baughman's door) Completed 12/05
3. Request copy of calibration records from Penske. None available. Technician was able to record temperature hourly for a period of 24 hours and found temp to be in calibration within 2 degree Fahrenheit.

Date: 12/20/2005

Performed By: LAB/AB

---

## Equipment & Calibration Records:

### Findings:

In general, all equipment was found to be maintained properly, operational, and calibration records up to date. Next professional calibration to be scheduled ranging from 3/06 to 7/06. Rented reefer unit calibration records were found not to be on file. Note was made to request from the rental agency. Large brittleness tester was found to be difficult to operate. Work order was filled out to request maintenance to add a loop to the cable.

## Review of Inspection Methods:

### Findings:

Inspection methods were found to be generally in compliance with quality manual and required procedures.

## Observation of Sampling & Testing Procedures:

### Findings

Sampling and testing were generally found to be in accordance with the plan set forth in the quality manual. Three random individuals were asked to perform various test methods that they had been trained on and all passed. Randy Herr performed an inner liner test, Brock Foor performed a weight test, and Matt Hull performed an Inside Diameter test. In addition, Lorie performed a brittleness and pipe stiffness for AI and passed. No remedial training required.

## Review of Resin & Product Certification Records:

### Findings

Resin reports and certifications were found to be complete and adequate.  
Product certification forms were available and reviewed. No issues noted.

## Review testing and inspection report documentation:

### Findings

All testing and inspection report documentation appeared to be in place and complete. No action required.

## Review non-conforming product documentation & actions taken:

### Findings

All non-conforming product documentation was found to be complete and accurate.



8516 Twp. Rd. 137  
Paulding, OH 45879  
Phone: (419) 399-3160  
Fax: (419) 399-4641  
Website: [www.baughmantile.com](http://www.baughmantile.com)

ATTACHMENT 8

Home of Poly-Drain<sup>®</sup>, Poly Smooth-Line<sup>®</sup>, Poly 3-Wall<sup>®</sup>, and PolyCap<sup>®</sup>

---

## Quality Mission Statement

**Baughman Tile Company, Inc. continually strives  
to become the highest quality provider of  
corrugated plastic pipe while maintaining  
excellent customer service and a low cost position  
in the corrugated pipe market.**

*Gene A. Baughman*  
*President & CEO*

## Quality Control Personnel Qualification

**Baughman Tile Company**  
**Quality Control/Assurance Training/Competency Evaluation**

**Lab Location:** \_\_\_\_\_

**Tr'ee = Trainee, Tr'er = Trainer**

Trainee Name:	Weight			Liner Thickness			Inside Diameter			Pipe Length			Brittleness			Workmanship			Carbon Content		
	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial

Trainee Name:	Marking			Perforations			Inlet Area			Pipe Stiffness			Elongation			Resin Melt Index			Resin Density		
	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial

- 1) To attest that the training took place, the initials of both the trainee and the trainer are required.
- 2) The initialing trainer attests that the technician satisfactorily demonstrated the test.
- 3) If the training is due to test method modification, indicate by an asterisk next to the initials of the trainee.

**Agency Information**

Third Party Calibration Agency Name:  
Physical Address of Agency:

Contact Name:  
Telephone:  
Fax:

**Equipment Information**

Equipment Number:  
Equipment Description:

Calibration Date:  
Performed By:

**Calibration Procedures/Reports/Findings (please list as descriptive as possible):**

☐ Equipment Approved for continued use

☐ Equipment Not Approved for continued use\*

\* If equipment is not approved, please list action plan (ex. Repairs to be made, replacement, additional calibration, etc)